REMARKS

By this amendment, claims 3, 7, 11, 16, 18, 20, 22, and 24 have been cancelled, and claims 1, 2, 4-6, and 15 have been amended,. Thus, claims 1, 2, 4-6, 8-10, 12-15, 17, 19, 21, and 23 are now active in the application. Reexamination and reconsideration of the application are respectfully requested.

The specification and abstract have been carefully reviewed and revised to correct grammatical and idiomatic errors in order to aid the Examiner in further consideration of the application. The amendments to the specification and abstract are incorporated in the attached substitute specification and abstract. No new matter has been added.

Attached hereto is a marked-up version of the changes made to the specification and Abstract by the current amendment. The attachment is captioned "**Version with markings to show changes made**."

On pages 2-7 of the Office Action, claims 1-4, 14-16, 23 and 24 were rejected under 35 U.S.C. 102(a) as being anticipated by Toshiaki (JP 2002-076101); claims 5-11, 17 and 18 were rejected under 35 U.S.C. 103(a) as being unpatentable over Toshiaka in view of Nikura et al. (U.S. 5,518,860); and claims 12, 13 and 19-22 were rejected under 35 U.S.C. 103(a) as being unpatentable over Toshiaka in viewof Misumi et al. (U.S. 6,641,972). These rejections are respectfully traversed in part and are believed clearly inapplicable to the claims as now presented, for the following reasons.

Initially, a machine translation of the JP 2002-76101 reference has now been obtained from the Japanese Patent Office website, and, for the Examiner's convenience, a copy of such machine translation is enclosed herewith.

With exemplary reference to the drawing figures, independent claim 1 sets forth a method for manufacturing semiconductor chips in which a semiconductor wafer W1, having a surface segmented by streets S and formed with a plurality of circuits C, is divided into individual circuit-based semiconductor chips, the method comprising: a support substrate integration step (see Figs. 3 and 4) of bonding a front surface (e.g. bottom surface in Figs. 3 and 4) of a

semiconductor wafer W1 to a light-transmissive support substrate 11 through an adhesive layer 10 having an adhesion force that is reduced upon exposure to light radiation, thereby exposing a back surface (top surface in Figs. 3 and 4) of the semiconductor wafer W1; a grinding step (see Fig. 5) of resting the semiconductor wafer W1 integrated with the support substrate 11 on a chuck table 27 of a grinding device and grinding the back surface (top surface in Fig. 5) of the semiconductor wafer W1; after the grinding step (e.g. see Fig. 5), performing a tape bonding step (e.g. see Fig. 6) of bonding a tape 40 on the back surface (e.g. bottom surface in Fig. 6) of the semiconductor wafer W1 while the semiconductor wafer W1 is integrated with the support substrate 11, and bonding a frame 41 on a periphery of the tape 40; after the tape bonding step (e.g. of Fig. 6), performing a re-bonding step (e.g. see Figs. 7-9) of applying light radiation (see Figs. 7 and 8) to the adhesive layer 10 from a side of the support substrate 11 to thereby reduce the adhesion force of the adhesive layer 10, and removing the support substrate 11 and adhesive layer 10 from the front surface (e.g. top surface in Figs 8 and 9) of the semiconductor wafer W1 to thereby support the semiconductor wafer W1 by the tape 40 and the frame 41; and a dicing step (e.g. see Figs. 10 and 11) of resting the semiconductor wafer W1 supported by the tape 40 and frame 41 on a chuck table 55 of a dicing apparatus 50 and cutting along the streets S to segment the semiconductor wafer W1 into the individual semiconductor chips.

Thus, according to claim 1, the semiconductor chip manufacturing method of the present invention requires that the support substrate 11 be bonded to the front surface (e.g. top surface in Fig. 6) of the semiconductor wafer W1, and that the tape 40 be bonded to the back surface (e.g. bottom surface in Fig. 6) of the semiconductor wafer W1.

As such, according to claim 1, the support substrate 11 is removed from the front surface of the semiconductor wafer W1 (see Fig. 9) upon the adhesion force of the adhesive layer 10 being reduced by exposure to light radiation.

In contrast to the present inventive method of claim 1, in the JP 2002-076101 reference (hereinafter the JP '101 reference), the semiconductor wafer W has its front surface (bottom surface in Fig. 3) bonded to a first plate 11 so as to expose the back surface (top surface in Fig. 3)

of the semiconductor wafer W, and a second plate 12 constituted by a heat shrinkable tape, is bonded to the front surface of the first plate 11 (i.e. in Fig. 3, the second plate 12 is bonded, not to the wafer W, but to the bottom surface of the first plate 11). Therefore, in the JP '101 reference, the heat shrinkable tape (constituted by the second plate 12) is not bonded to the back surface of the semiconductor wafer (i.e. to the surface of the wafer opposite to the surface bonded to the support plate), as required by claim 1. This bonding of the heat-shrinkable tape 12 to the first plate (i.e. support plate 11) and not to the semiconductor wafer W is an important feature of the JP '101 reference because this bonding of the heat-shrinkable tape 12 to the support plate 11 (and not to the semiconductor wafer W) allows for exfoliation (i.e. removal) of the individual semiconductor chips C by causing curving of the support plate 11 (as shown in Fig. 8) upon application of heat to the heat-shrinkable tape 12.

For these reasons, it is believed apparent that the present inventive method of claim 1 is not anticipated by the JP '101 reference. Furthermore, for the above reasons, it is believed apparent that a person of ordinary skill in the art would clearly not have been motivated to modify the JP '101 reference in such a manner as to result in or otherwise render obvious the present invention of claim 1, because doing so would render the JP '101 invention inoperable for its intended purpose (i.e. the removal of the individual semiconductor chips C by curving of the support plate 11 upon heat-shrinkage of the heat-shrinkable tape 12).

Again, with exemplary reference to the drawing figures, independent claim 2 sets forth a method for manufacturing semiconductor chips in which a semiconductor wafer W2, having a surface segmented by streets S and formed with a plurality of circuits C, is divided into individual circuit-based semiconductor chips, the method comprising: a groove forming step (e.g. see Figs. 12 and 13) of resting a semiconductor wafer W2 on a chuck table 55 of a dicing apparatus 50 (see Fig. 10) and forming grooves 60 in a front surface (top surface in Figs. 12 and 13) of the semiconductor wafer W2 to segment the plurality of circuits C; a support substrate integrating step (see Figs. 14 and 15) of bonding the front surface (bottom surface in Figs. 14 and 15) of the semiconductor wafer W2 to a light-transmissive support substrate 11 through an

adhesive layer 10 having an adhesion force that is reduced upon exposure to light radiation, thereby exposing a back surface (top surface in Fig. 15) of the semiconductor wafer W2; a grinding step (e.g. see Fig. 5) of resting the semiconductor wafer W2 integrated with the support substrate 11 on a chuck table 27 of a grinding apparatus 20 and grinding the back surface (top surface in Figs. 5 and 16) of the semiconductor wafer W2 until the grooves 60 are exposed through the back surface (top surface in Fig. 16) of the semiconductor wafer W2 to segment the semiconductor wafer W2 into individual semiconductor chips; after the grinding step, performing a tape bonding step (see Fig. 17) of bonding a tape 40 on the back surface (bottom surface in Fig. 17) of the semiconductor wafer W2 while the semiconductor wafer W2 is integrated with the support substrate 11 and maintaining an outer shape of the semiconductor wafer W2, and supporting a periphery of the tape 40 by a frame 41; and after the tape bonding step, performing a re-bonding step (see Figs. 18-20) of applying light radiation (see Figs. 18 and 19) to the adhesive layer 10 at a side close to the support substrate 11 to thereby reduce an adhesion force of the adhesive layer 10, and removing the support substrate (Fig. 20) and adhesive layer from the front surface (top surface in Fig. 20) of the semiconductor wafer W2 such that the semiconductor wafer W2 is supported by the tape 40 and the frame 41.

Thus, similarly to the inventive method of claim 1, in the inventive method of claim 2, the support substrate 11 is bonded to the front surface (top surface in Figs. 17 and 18) of the semiconductor wafer W2, and the tape 40 is bonded to the back surface (bottom surface in Figs. 17 and 18) of the semiconductor wafer W2.

In contrast to the present inventive method of claim 2, and as discussed above in the comments supporting the patentability of claim 1, the JP '101 reference does not disclose the bonding of a support substrate to a front surface of a semiconductor wafer, and the bonding of a tape to the back surface of the semiconductor wafer. Rather, as illustrated in Figs. 3 and 8, for example, of the JP '101 reference, the support plate 11 is bonded to the front surface of the semiconductor wafer W (which is divided into chips C in Fig. 8), and the heat-shrinkable tape 12 of the JP '101 reference is bonded to the surface of the support plate 11 opposite the surface

bonded to the semiconductor wafer W (i.e. the heat-shrinkable tape 12 is not bonded to the semiconductor wafer W in the JP '101 reference). Also as discussed above, this arrangement of heat-shrinkable tape on the surface of the support plate 11 opposite the semiconductor W is important in the JP '101 invention so as to allow for the curving of the support plate 11 upon application of heat to the heat-shrinkable tape 12 (see Fig. 8), so as to allow exfoliation (removal) of the individual chips C from the support plate 11.

Thus, in view of the clear differences between the present inventive method of claim 2 and the JP '101 reference, it is apparent that the JP '101 reference does not anticipate the method of claim 2. Furthermore, the differences are such that a person having ordinary skill in the art would clearly not have been motivated to modify the JP '101 reference or to make any combination of the references of record in such a manner as to result in or otherwise render obvious the present invention of claim 2, because doing so would render the JP '101 invention inoperable for its intended purpose.

Thus, for the above reasons, it is respectfully submitted that claims 1 and 2, as well as the claims depending therefrom, are clearly allowable over the prior art of record.

The Examiner cited the Nikura et al. patent (U.S. 5,518,860) for disclosing "the adhesive layer being a liquid resin containing quinone-diazido" and cited the Misumi et al. patent (U.S. 6,641,972) for disclosing "the liquid resin having the viscosity of 10-100000mPa s" and for disclosing the liquid resin being dripped on the surface of the support substrate or the semiconductor wafer and spin-coated under rotation." However, these teachings of the Nikura et al. patent and the Misumi et al. patent clearly provide no teaching or suggestion that would have obviated the above-discussed shortcomings of the JP '101 reference.

In view of the foregoing amendments and remarks, it is respectfully submitted that the present application is clearly in condition for allowance. An early notice thereof is earnestly solicited.

If, after reviewing this Amendment, the Examiner feels there are any issues remaining which must be resolved before the application can be passed to issue, it is respectfully requested that the Examiner contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

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April 10, 2006

* NOTICES *

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the maintenance plate holding a body, and the operation of this maintenance plate.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] Lightweight-izing, a miniaturization, and thin shape-ization are demanded of devices, such as a cellular phone and a personal computer (personal computer), and also forming more thinly the thickness of the semiconductor chip used for these corresponding to this with 200 micrometers or less and 100 more micrometers or less is called for.
[0003] In order to meet such a demand, before carrying out grinding of the rear face of (1) semiconductor wafer, the dicing slot which is not penetrated to a rear face is formed in the front face comparatively shallowly. The technique divided into each semiconductor chip by carrying out grinding of the rear face of the semiconductor wafer after that, and making a dicing slot express from a rear-face side, (2) After dividing a semiconductor wafer into a semiconductor chip, the technique which carries out grinding of the rear face of each semiconductor chip, and forms it thinly is developed and put in practical use.
[0004] And since it is necessary to prevent that hold a thin semiconductor wafer or a thin semiconductor chip, and a crack arises with a rigid high maintenance plate comparatively in the case of processing in order to form a thin semiconductor chip by the above technique, an adhesive layer is formed in the front face of plates, such as a glass plate and a plastic sheet, a maintenance plate is constituted, and technique, such as carrying out grinding of a semiconductor wafer or the semiconductor chip to this, where attachment immobilization is carried out, is taken.

[Translation done.]

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, there is a problem that a semiconductor chip will damage the semiconductor chip thinly formed of grinding if it is going to exfoliate that it is difficult to exfoliate from a maintenance plate and by force. Such a problem is generated in common with the case where a semiconductor wafer or not only a semiconductor chip but the body which is easy to damage is held with the maintenance plate.
[0006] Therefore, in case a body is exfoliated from a maintenance plate, it has the technical problem to enable it to exfoliate, without damaging a body.

[Translation done.]

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MEANS

[Means for Solving the Problem] It is the maintenance plate with which this invention holds a body as a concrete means for solving the above-mentioned technical problem, and the maintenance plate which consists of the first plate which has the rigidity of extent which can support a body stably, the second plate which it is fixed to the rear face of the first plate, and is contracted with the heat of predetermined temperature, and an adhesive layer formed in the front face of the first plate at least is offered.
[0008] And the first plate's having consisted of plastics materials for this maintenance plate, the second plate's having consisted of heat shrink nature tapes, and the first plate's and second plate's having fixed by the bond agent and an adhesive layer make it additional requirements to consist of UV hardenability binders with which it hardens by ultraviolet rays and adhesion declines.
[0009] Thus, since the maintenance plate constituted can be incurvated only by applying heat, it can reduce the adhesion of a maintenance plate and the body held very easily, and can exfoliate a body.
[0010] Moreover, when UV hardening mold binder which is a binder of the type with which it hardens by ultraviolet rays and adhesion declines as a binder used for an adhesive layer is used, before exfoliating a body from a maintenance plate, adhesion can be reduced by irradiating ultraviolet rays.
[0011] Moreover, the process which this invention is the operation of the above-mentioned maintenance plate, and sticks a body on the adhesive layer of a maintenance plate, The process which lays the maintenance plate holding a body in the chuck table of processing equipment,

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective view showing the first plate and second plate which constitute the maintenance plate concerning this invention.
[Drawing 2] It is the perspective view showing this maintenance plate.
[Drawing 3] It is the perspective view showing signs that the semiconductor wafer with which the dicing slot was formed was stuck on this maintenance plate.
[Drawing 4] It is the front view showing the semiconductor wafer with which this dicing slot was formed.
[Drawing 5] It is the perspective view showing the grinding attachment which carries out grinding of this semiconductor wafer.
[Drawing 6] It is the explanatory view showing the configuration of this grinding attachment.
[Drawing 7] The semiconductor chip formed of grinding is the perspective view showing signs that it is held with the maintenance plate.
[Drawing 8] It is the front view showing the semiconductor chip held at the curved maintenance plate and its maintenance plate.
[Description of Notations]
10 -- Maintenance plate 11 -- The first plate
12 -- The second plate 13 -- Dicing slot
20 -- Grinding attachment 21 -- Pedestal 22 -- Wall
23 -- Rail 24 -- Support plate 25 -- Grinding means
26 -- Turntable 27 -- Maintenance table
27a -- Adsorption side 28 -- Spindle unit
28a -- Spindle housing 28b -- Spindle
29 -- Mounter 30 -- Grinding wheel 31 -- Grinding stone
32 -- Ball screw 33 -- Pulse motor 34 -- Supporter
35 -- Pulse motor driver 36 -- Control section
37 -- Linear scale 38 -- Servo driver
39 -- Encoder 40 -- Servo motor

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the maintenance plate holding a body, and the operation of this maintenance plate.
[0002]
[Description of the Prior Art] Lightweight-izing, a miniaturization, and thin shape-ization are demanded of devices, such as a cellular phone and a personal computer (personal computer), and also forming more thinly the thickness of the semiconductor chip used for these corresponding to this with 200 micrometers or less and 100 more micrometers or less is called for.
[0003] In order to meet such a demand, before carrying out grinding of the rear face of (1) semiconductor wafer, the dicing slot which is not penetrated to a rear face is formed in the front face comparatively shallowly. The technique divided into each semiconductor chip by carrying out grinding of the rear face of the semiconductor wafer after that, and making a dicing slot express from a rear-face side, (2) After dividing a semiconductor wafer into a semiconductor chip, the technique which carries out grinding of the rear face of each semiconductor chip, and forms it thinly is developed and put in practical use.
[0004] And since it is necessary to prevent that hold a thin semiconductor wafer or a thin semiconductor chip, and a crack arises with a rigid high maintenance plate comparatively in the case of processing in order to form a thin semiconductor chip by the above technique, an adhesive layer is formed in the front face of plates, such as a glass plate and a plastic sheet, a maintenance plate is constituted, and technique, such as carrying out grinding of a semiconductor wafer or the semiconductor chip to this, where attachment immobilization is carried out, is taken.
[0005]
[Problem(s) to be Solved by the Invention] However, there is a problem that a semiconductor chip will damage the semiconductor chip thinly formed of grinding if it is going to exfoliate that it is difficult to exfoliate from a maintenance plate and by force. Such a problem is generated in common with the case where a semiconductor wafer or not only a semiconductor chip but the body which is easy to damage is held with the maintenance plate.
[0006] Therefore, in case a body is exfoliated from a maintenance plate, it has the technical problem to enable it to exfoliate, without damaging a body.
[0007]
[Means for Solving the Problem] It is the maintenance plate with which this invention holds a body as a concrete means for solving the above-mentioned technical problem, and the maintenance plate which consists of the first plate which has the rigidity of extent which can support a body stably, the second plate which it is fixed to the rear face of the first plate, and is contracted with the heat of predetermined temperature, and an adhesive layer formed in the front face of the first plate at least is offered.
[0008]

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CLAIMS

[Claim(s)]
[Claim 1] The maintenance plate which is a maintenance plate holding a body and consists of the first plate which has the rigidity of extent which can support this body stably, the second plate which it is fixed to the rear face of this first plate, and is contracted with the heat of predetermined temperature, and an adhesive layer formed in the front face of this first plate at least.
[Claim 2] It is the maintenance plate according to claim 1 which the first plate was constituted from a plastics material, the second plate was constituted from a heat shrink nature tape, and this first plate and this second plate have fixed by the bond (trademark) agent.
[Claim 3] An adhesive layer is a maintenance plate according to claim 1 or 2 which consists of UV hardenability binders with which it hardens by ultraviolet rays and adhesion declines.
[Claim 4] The process which is the operation of a maintenance plate according to claim 1 to 3, and sticks a body on the adhesive layer of this maintenance plate, The process which lays the maintenance plate holding this body in the chuck table of processing equipment, The process which performs predetermined processing to this body, and the process which removes this maintenance plate from this chuck table after this predetermined processing is completed, Operation of the maintenance plate which consists of a process which the heat of predetermined temperature is applied [process] to this maintenance plate, and incurvates this maintenance plate to a rear-face side, and a process which exfoliates the body stuck on this maintenance plate from an adhesive layer.
[Claim 5] Operation of the maintenance plate according to claim 4 which carries out the process as for which ultraviolet rays are irradiated [process] and the adhesive layer of a maintenance plate reduces adhesion between the processes which the heat of predetermined temperature is applied [processes] to the rear face of the process and this maintenance plate which remove a maintenance plate from a chuck table after predetermined processing is completed, and incurvate this maintenance plate to a rear-face side.
[Claim 6] The heat of predetermined temperature is the operation of the maintenance plate according to claim 4 or 5 supplied with the warm water of predetermined temperature.
[Claim 7] A body is a semiconductor chip and it is the grinding attachment equipped with the spindle unit which supports the grinding wheel arranged by processing equipment standing face to face against the chuck table and this chuck table which carry out suction immobilization of the maintenance plate, and this grinding wheel pivotable at least. Predetermined processing Operation of the maintenance plate according to claim 4 to 6 which is processing which sticks the front face of a semiconductor chip on this maintenance plate, carries out grinding of the rear face of this semiconductor chip by this grinding wheel, and forms this semiconductor chip in predetermined thickness.

[Translation done.]